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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/858,400	05/16/2001	Eric Gerritsen	97-CCP-251 DIV	2138

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EXAMINER

NGUYEN, THANH T

ART UNIT PAPER NUMBER

2813

DATE MAILED: 01/03/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/858,400

Applicant(s)

GERRITSEN ET AL.

Examiner

Thanh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 22-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Election/Restriction

Applicant's election of Group I, claims 1-21 in Paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Accordingly, claims 22-29 have been canceled by the applicant.

Oath/Declaration

The oath/declaration filed on 5/16/01 is acceptable.

Drawings

The formal drawings filed on 5/16/01 are acceptable.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: --Process for forming a low-resistivity titanium silicide layer on a silicon semiconductor substrate--.

Claim Rejections - 35 USC § 112

Claims 1-14 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 10, "sometime after" is indefinite as to it is unclear when would it be considered "sometime after". It is suggested to delete "sometime".

Claim 1 recites the limitation "the titanium-coated silicon" in line 11. There is insufficient antecedent basis for this limitation in the claim. It is suggested to change to "a titanium-coated silicon".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (e) the invention was described in-
 - (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
 - (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

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Claims 1-10, 12-19, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Iwata et al. (U.S. Patent No. 6,255,702).

Referring to figures 14a-14c, 15d-15f, 16g-16i, 17j-17k, teaches a method for forming a low resistivity titanium silicide layer on a surface of at least one doped area of a silicon semiconductor substrate, the method comprising the steps of:

Depositing a titanium layer (146, see fig. 16h, col. 30, lines 11-13) on the surface of the at least one doped area (409, Indium, see figure 14d, col. 29, lines 40-45) of the silicon semiconductor substrate (401, see figure 14a, col. 29, lines 13-15),

Introducing an effective amount of a metallic element at least at the interface between the titanium layer (146) and the at least one doped area (401) of the silicon semiconductor substrate (401), the metallic element being chosen from the group consisting of indium, gallium, tin, and lead, and

After the introducing step, performing a rapid thermal annealing of a titanium-coated silicon semiconductor substrate (see figure 16i, col. 30, lines 47-65) to form titanium silicide (418).

Regarding to claims 2, 3 and 16, the metallic element is chosen from the group consisting of indium (see figure 14d, col. 29, lines 40-45).

Regarding to claims 4-6 and 17, the effective amount of the metallic element is 1×10^{13} - 5×10^{14} atoms/cm² (see figure 14d, col. 29, lines 45-49).

Regarding to claims 7 and 18, the introducing step includes the sub-step of depositing the effective amount of the metallic element on the surface of the at least one doped area of the silicon semiconductor substrate (see figure 14d, col. 29, lines 40-50).

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Regarding to claims 8 and 19, the introducing step includes the sub-step of implanting the effective amount of the metallic element on the surface of the at least one doped area of the silicon semiconductor substrate (see figure 14d, col. 29, lines 40-50).

Regarding to claims 9 and 14, implanting the sub-step is performed before the depositing step (see figure 14d, col. 29, lines 40-50).

Regarding to claims 12-13 and 21, implanting sub-step, the implantation energy is approximately 25 keV (see figure 14d, col. 29, lines 40-50).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata et al. (U.S. Patent No. 6,255,702) as applied to claims 1-10, 12-19, and 21 above.

Iwata et al. teaches all of the limitation that described in the claimed invention above. However, the reference does not teach the specific depth of the implanted region (in claims 11 and 20).

The specific depth of the implanted region are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* 105

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USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious:

“Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed “critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”

In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time the invention was made would have used any depth range suitable to the method in process of Iwata et al. in order to optimize the process.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (703) 308-9439, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:30AM to 4:00PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (703) 308-4940. The fax phone number for this Group is (703) 308-7722.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (See **MPEP 203.08**).

Thanh Nguyen

December 24, 2002


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
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